NUARY
1947

Journal of DENTAL MEDICINE

IN THIS ISSUE

Editorial 3

Nutritional Lesions of the Mouth Related to Endocrine Disfunctions — *Morton S. Biskind*.... 4

Steering Toward Dental Health *Frances Krasnow* 10

The Effects of Pregnancy on the Soft Tissues of the Mouth — *Tolar N. Hamblen*.....12

A Case of Pemphigus — *Harry Roth*.....24

A Cuban Dentist Looks at Dentistry in the United States — *Elva E. Ricardo*.....26

Answers to Timely Questions 27

Abstracts and Comments 29

Book Review 31

Announcements 31

Volume 2 Number 1

PUBLISHED BY

AMERICAN ACADEMY OF DENTAL MEDICINE

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THE JOURNAL OF DENTAL MEDICINE

Published by
The American Academy of Dental Medicine

Volume 2 January 1947 Number 1

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Published quarterly at New York, N. Y.

Editor—Allan N. Arvins, 4 East 41 St., New York 17, N. Y.

Business Manager—Louis R. Burman, 1235 Grand Concourse, New York 52, N. Y.

Subscription $3.00 Yearly Single copies, $1.00

Publication in the Journal of Dental Medicine is not an endorsement by the Journal of the American Academy of Dental Medicine of opinions in any article, abstract or extract. The Editor and Publisher are not responsible for opinions expressed by authors of contributions.

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OBJECTIVES OF THE AMERICAN ACADEMY OF DENTAL MEDICINE

(*Quoted from the Constitution*)

"To promote the study and dissemination of knowledge of the cause, prevention and control of diseases of the teeth, their supporting structures and adnexa and related subjects; and to foster and promote a better scientific understanding between the fields of dentistry and medicine."

THE JOURNAL OF DENTAL MEDICINE

Volume 2 January 1947 Number 1

EDITORIAL

RESEARCH IN DENTAL MEDICINE

Now that the UN and the foreign ministers of the Big Five have embarked on the quest for lasting peace and closer relationship between the continents, signs of world reconstruction are appearing. With reconstruction there comes a glorious opportunity for research and study. Even as this is written, a number of medico-dental teams are at work in various parts of Europe on research problems.

Unfortunately, medical research in the past has neglected the problems of the teeth and supporting tissues. We have always contended that research is far from complete unless these problems are included.

Hospitals without adequate dental departments, fail to give their patients a *complete* physical examination. Animal experimentation which does not include investigation of the effects on teeth and supporting structures is emphatically deficient. Often, the supporting structures of the teeth are the first structures in the body to be affected by systemic dysfunction.

It is, therefore, with a great deal of satisfaction that we note the inclusion of outstanding dentists in recent research projects. This progressive step will enable both physician and dentist to understand dental medicine more completely.

However, the opportunity which is now presented calls for scrupulous care on the part of the dental profession. We must study every possible local and systemic etiological factor related to oral pathology, so that no errors will creep into our work in contact with the medical fraternity. We must not ride a hobby and predetermine the etiology by virtue of our interest in one particular phase.

For example, in certain recent research, the question of psychosomatic dentistry was not even considered, although the work was taking place in a country subjected to devastation by airplane raids and all the sufferings and horrors of war. Investigation of the nervous reactions on the teeth and supporting structures, the neurotic habits and miscellaneous habits had been neglected.

These habits may have well played a role in the development of mouth lesions. *All known local and systemic factors* must be understood and studied so as to be applied to the particular problem at hand.

A dental research group should fully understand and evaluate *every known local and systemic factor* which presents itself. Only in such manner, can our observations be a contribution to progress. Regardless of what work the medical world is doing, one must realize that many systemic conditions may be observed locally—the changes occurring in the mouth. These changes may also be due to purely local factors entirely divorced from any systemic relationship.

A golden age of research is presenting itself. Let us be fully prepared to meet this challenge.

S. S.

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NUTRITIONAL LESIONS OF THE MOUTH RELATED TO ENDOCRINE DISTURBANCES

MORTON S. BISKIND, M.D., New York, N. Y.

The tissues of the mouth, perhaps more than any other accessible portion of the body, reflect the nutritional status of the individual. Lesions of the lips, tongue, gums, and oral and pharyngeal mucous membranes, indicative of nutritional deficiency, are extremely common and are readily discernible with the naked eye. The appearance of these lesions is a matter of grave concern for general bodily health, as they indicate not only a serious depletion of substances indispensable to cellular metabolism, but also the occurrence of secondary endocrine disturbances of far-reaching significance.

Primarily these disturbances entail impairment of hepatic function on a nutritional basis, and secondarily the inductions of disorders associated with the presence of an excess of body estrogen.

Evidence that estrogen is destroyed in the liver began to accumulate even before isolation of the first crystalline estrogen in 1929. Subsequently, following the initial detailed study of Zondek, several other investigators, utilizing different methods, obtained results indicating hepatic destruction of estrogen. The early literature has been reviewed elsewhere. [1, 2]

G. R. Biskind,[3] in 1938, devised an ingenious technic for studying this problem *in vivo*. This method has developed into an extremely useful means for investigation of disturbances in hepatic function and surpasses in sensitivity any other technic thus far developed. Pellets of crystalline estrogens or androgens were implanted into the spleens of castrate female or male rats. The vessels of the spleen drain into the portal circulation and the absorbed steroid must therefore pass through the liver before reaching the systemic circulation. Thus, a castrate female with a pellet of estrone or estradiol in the spleen, remains anestrous; but if the spleen containing the pellet is transplanted subcutaneously, and after development of a collateral circulation, the pedicle is ligated, the animal goes into continuous estrus. Analogous results may be obtained in the male, using the weight of prostate and seminal vesicles as the indicator. The livers of both male and female rats were found to inactivate both estrogens and androgens.[4] The sensitivity of this method may be appreciated by the fact that failure of the liver to inactivate as little as 0.1 microgram of estrogen per day (or less) may be detected.

Owing to experimental and clinical studies indicating that morphologic changes in the liver may result from deficiency of factors of the vitamin B complex, the aforementioned technic was applied to the problem of nutritional impairment of hepatic *function*. Castrate female rats with pellets of estrone in their spleens remained anestrous so long as they were maintained on a complete diet. But when they were placed on a vitamin B complex-free diet, they became estrous and remained so.[1, 5, 6] Addition of brewers yeast (or a mixture of thiamine, riboflavin, pantothenic acid and pyridoxine) promptly restored the anestrous state and subsequent depletion again led to estrus. Thus the flow of estrogen through the liver could be controlled at will, by withholding the B vitamins or restoring them to the diet. However, there was no necessary correlation between the functional disturbance and morphologic changes. Failure of inactivation of estrogen occurred in livers that were normal histologically, while seriously damaged livers could continue to inactivate estrogen.[1, 2]

A subsequent investigation on the inactivation of androgen in the liver led to a different result, for there was no significant impairment of this fuction during vitamin B complex deficiency.[7] Estrogen ceases to be inactivated in the liver while androgen continues to be destroyed; thus a serious alteration in the estrogen-androgen equilibrium must result in deficiency of the vitamin B factors.

*From the Endocrine Laboratory and Clinic, Beth Israel Hospital, New York.

These observations in animals are in complete agreement with clinical studies by Glass and his coworkers[8] on male patients with cirrhosis of the liver, associated with testicular atrophy and gynecomastia. In these patients the urinary estrogen was increased in amount and appeared in active, uncombined form, while the androgen was somewhat reduced in quantity and was all excreted in inactive, combined form.

The investigations already described which indicated an alteration of the estrogen-androgen equilibrium in deficiency of the vitamin B complex, led to clinical observations to determine whether there was any correlation between nutritional deficiency and the occurrence of syndromes related to excess estrogen.[9] In the female these are meno-metrorrhagia, cystic mastitis, premenstrual tension, neoplasms of the breast and uterus and postpartum subinvolution of the uterus; in the male, testicular atrophy, gynecomastia, diminished libido and potency and infertility.[10] Such a correlation was indeed found to exist. Patients with these syndromes had various indications of nutritional deficiency and the endocrine disturbances responded promptly and often dramatically to intensive, complete nutritional therapy.[9, 10, 11, 12] Atrophic glossitis and gingivitis were extremely common, cheilosis less so; other visible lesions were the characteristic seborrheic ("muddy") complexion, a seborrheic, erythematous eruption about the alae nasae, keratosis toward the inner canthus of the lower eyelids injection of the conjunctivae, marked about the periphery of the corneae, splitting of the fingernails in layers, palmar erythema, cutaneous vascular "spiders,"[13] and occasionally actual pellagrous dermatitis, involving the malar areas of the face in the typical "butterfly" distribution, or the ears, hands, wrists, elbows, ankles or knees, being always symmetrical and bilateral. Associated with the objective disturbances there are usually changes in the nervous system: excessive nervous irritability, insomnia, headaches, impairment of memory for recent events, "clouding" of consciousness, excessive fatigability, and peripheral neuritis, manifested in the early stages by spontaneous cramping of the muscles, especially the gastrocnemii, and later by pain in arms and legs and lumbar area, loss of achilles and patellar reflexes, and eventually actual muscle weakness.

In the course of the five years that these studies have been carried on, more than 700 cases involving pathologic uterine bleeding and the like, were observed and treated with vitamin B complex in three independent series of cases in eastern, western and mid-western portions of the country (in collaboration with Drs. G. R. and L. H. Biskind).[14] The results were uniformly favorable, for not only did the endocrine disturbances clear up but the indications of nutritional deficiency subsided simultaneously and vast improvement in general health was the rule. In another series,[12] administration of vitamin B complex during pregnancy led to striking reduction in the incidence of postpartum subinvolution of the uterus and its complications.

The association of lesions of nutritional deficiency with aberrations of the sexual function in the male was found to be no less common than in the female. Patients with testicular atrophy, sterility, or loss of libido and potency, were found often to have more or less severe lesions of avitaminosis and both the endocrine and nutritional disturbances responded to vitamin therapy.[2, 10]

Still another endocrine disturbance related to impairment of hepatic function is diabetes. It has long been customary to think of diabetes solely in terms of insulin deficiency, simply because insulin, in most cases, improves carbohydrate metabolism. But during a decade of fundamental investigations, Soskin and his collaborators [15] have shown that, provided the barest minimum amount of insulin is present in the body, it is the liver and not the pancreas that controls the blood sugar. Thus:

(1) In pancreatectomized animals receiving a constant intravenous injection of insulin just sufficient to maintain normal blood sugar, administration of dextrose

yields *normal* dextrose tolerance curves.

(2) In hepatectomized animals with intact pancreas, receiving a constant intravenous injection of dextrose just sufficient to maintain normal blood sugar, administration of additional dextrose yields *diabetic* dextrose tolerance curves.

(3) When the liver is damaged by a toxic agent, the diabetic type of dextrose tolerance curve is obtained.

Observations indicating the occurrence of lesions in diabetes now known to be nutritional in origin, were recorded in the medical literature almost 40 years ago. Stockton,[16] in 1908, wrote, "The tongue in diabetes is large, red, 'beefy,' and bordered with a fissured margin . . . ," a classical description of pellagrous glossitis. Futcher,[17] a year earlier, reported functional changes in the nervous system of diabetics, now known to be nutritional in origin. Many other neglected observations during the past half-century, discussed elsewhere[2] in detail, pointed to a nutritional defect in diabetes.

Biskind and Schreier[18] observed 94 diabetics over a period of two years and were impressed by the invariable occurrence of indications of nutritional deficiency, as well as by the simultaneous appearance of syndromes related to excess estrogen. They instituted complete, intensive and persistent nutritional therapy in these diabetics, with the result that not only did the nutritional lesions heal and the syndromes related to excess estrogen subside, but the diabetic state in most cases was vastly improved:

Fourteen patients who required an average of 41 units of insulin per day before therapy, needed only an average of 18 units to maintain adequate carbohydrate balance on B complex. Sixteen patients were able to discontinue insulin entirely. Twenty-five patients showed reductions in fasting blood sugar from an average of 270 mg. to an average of 123 mg. on vitamin therapy alone. And the remaining patients in the series (with but two exceptions), who were maintained on the same dosage of insulin, all showed marked improvement in general health and usually a more even control of carbohydrate metabolism, than before vitamin therapy.

Thus, as Biskind and Schreier[18] have pointed out, diabetes appears for the most part, not to represent insulin deficiency, but impaired hepatic response to endogenous insulin, which need not be deficient. The response of the liver to insulin, whether endogenous or exogenous, can be greatly enhanced by nutritional therapy.

As already indicated at the beginning of this article, the studies briefly discussed here are of significance with reference to oral lesions of nutritional deficiency, with regard both to diagnosis and treatment of the systemic disturbances and therapy of the lesions themselves.

Of the oral lesions, chronic gingivitis and secondary changes in teeth and alveolar processes, are the ones of most interest in dentistry. That these lesions have a nutritional basis has frequently been recognized.** Benefiit has often been derived from the use of ascorbic acid or niacinamide or both. But deficiencies of single factors rarely, if ever, occur and treatment with one or more of the known crystalline water-soluble factors rarely gives more than moderate and evanescent improvement. (In fact, such therapy is frequently harmful, as it leads to precipitation of deficiencies of related factors, with occurrence of such lesions as cheilosis, peripheral neuritis, and the like.)

Complete, intensive and persistent therapy with all the known vitamins, plus the as yet unidentified but equally important accessory factors (derived preferably from liver),[22] produces remarkable improvement even in severe gingivitides that have persisted for years and have failed to respond to the crystalline vitamins.[23] However, chronic gingivitis tends to heal more slowly than some of the other lesions and often requires many months for complete subsidence. Associated with healing of the gingivae, the secondary changes in the alveolar processes subside concomitantly; teeth so loose in their sockets that extraction has been

contemplated, have been observed gradually to acquire a healthy firmness.

Case Reports

Case 1. Mrs. L. B., age 37, had progressively increasing emotional instability for the preceding eight months. She was greatly concerned about this relatively sudden "personality change," which was in sharp contrast to her previously placid disposition. Associated with this there was marked fatigability, insomnia, nervous hyperirritability and mental depression, headaches, lumbar backache, repeated attacks of sciatica, numbness of fingers, severe premenstrual tension and premenstrual breast tenderness, associated with moderate cystic mastitis. Orally, there was moderately severe atrophic glossitis, and extremely severe gingivitis associated with progressive loosening of all the teeth. The latter condition was so severe in the maxilla that the patient had been advised to have all her upper teeth removed; this she refused to permit. She had been taking 3 to 4 grains of thyroid a day irregularly for about fifteen years for alleged hypothyroidism. Therapy was instituted, providing orally per day 48 mg. thiamine, 33 mg. riboflavin, 240 mg. niacinamide, 300 mg. ascorbic acid, 90 mg. choline, 45 mg. inositol, 42 mg. pantothenic acid, 4 mg. pyridoxine, 30,000 units vitamin A, 3,000 units vitamin D and 30 mg. alphatocopherol together with a mixture of liver fractions derived from approximately 100 Gm. fresh liver. Within a month the emotional instability and related symptoms had completely subsided, there was marked improvement in the tongue, moderate improvement in the gingivitis. The premenstrual symptoms did not recur. Thyroid was discontinued; on nutritional therapy alone the basal metabolic rate increased from minus 15 to plus 5 in 10 months.† Improvement in the oral lesions was progressive and at the end of the 10 month period the glossitis and gingivitis had completely healed and all the teeth had attained normal firmness. Among other changes that occurred during nutritional therapy was a marked improvement in a previously progressive myopia.

Case 2. W. H., a male diabetic, age 33, had hepatomegaly, a fasting blood sugar of 268 mg. per 100 cc., blood cholesterol of 388 mg. per 100 cc., glossitis, severe gingivitis and numerous other indications of vitamin B complex deficiency. Therapy similar to that in case 1, with the addition of desiccated whole liver orally and daily parenteral vitamin B complex, led to reduction in blood sugar to 102 mg. and in blood cholesterol to 257 mg. in 12 days. Within two months there was marked diminution in the size of the liver, and both glossitis and gingivitis had completely healed. At the time of writing, the diabetes and all the avitaminotic lesions have been completely under control on nutritional therapy alone for 20 months.

Case 3. A boy, J. B., age 11, had numerous indications of nutritional deficiency, including glossitis, moderately severe gingivitis, very severe cheilosis, conjunctival injection, splitting of fingernails in layers, and the like. He complained of constant fatigue. Over a period of 6½ months he received nutritional therapy in suitable dosage similar to that provided in case 1, except that the natural source was derived from both liver and yeast. On re-examination at the end of this period all the avitaminotic lesions, including the gingivitis, had completely healed, and there was no longer excessive fatigability.

The Method of Nutritional Therapy

For adequate nutritional therapy three basic requirements must be fulfilled: (1) Complete therapy; (2) Intensive dosage by routes assuring adequate utilization; (3) Persistent administration. Many failures result from disregard of one or more of these principles.

Because the use of single drugs has a strong tradition in modern medicine (in reaction to the unscientific "shotgun" therapy that persisted to two or three generations ago), it is common practice to administer thiamine or niacinamide or riboflavin or ascorbic acid alone in large doses in an effort to counteract a predominant deficiency of one of these factors. But single deficiencies are virtually impossible in clinical medicine; factors

which lead to loss of thiamine from the diet, for instance, inevitably lead to loss of other substances that occur with it and have similar solubilities, or are also labile to heat, alkalinity or oxidation. Similarly, conditioning factors which operate to produce nutritional deficiency even on an optimum diet, tend inevitably to produce deficiencies of several factors at once.

Not only therefore are deficiencies multiple, but the administration of single nutritional factors (or even of a combination of a few of them) may lead to serious disturbance of a tenuous nutritional equilibrium and precipitation of new avitaminotic lesions. Those familiar with the history of the early use of niacin in the treatment of pellagra will recall the glowing preliminary reports of rapid healing of the skin lesions and the glossitis, soon to be followed by pessimistic accounts of the appearance of secondary lesions, such as cheilosis and peripheral neuritis. Addition to the therapeutic regimen of an adequate natural source of nutritional factors, led to prompt subsidence of all the lesions.

Depending on the original nutritional status and response of the patient, adequate nutritional therapy might require 2 or 3 capsules a day of the therapeutic formula type of preparation, providing most of the crystalline water-soluble factors and A, D and E. In addition, a vitamin B complex preparation consisting of a fortified or unfortified natural source or sources, preferably liver, is essential. This must be given in sufficient dosage to provide material derived from at least 45 Gm. and occasionally as much as 150 Gm. of the fresh natural source a day. As the concentration of the nutritional liver preparations varies usually from 1:5 to 1:20, this permits the use of a therapeutically feasible number of capsules or tablets, or equivalent amount of liquid or powder.‡

A number of severely deficient patients require parenteral therapy in addition, with a frequency varying from daily to three times a week. This usually provides, in each injection, thiamine 10-60 mg., riboflavin 5-10 mg., pyridoxine 5-10 mg., calcium pantothenate 5 to 50 mg. and niacinamide 50-250 mg. Sodium ascorbate 50-100 mg. may be mixed with the B vitamins in the same syringe.

Even after all avitaminotic lesions have healed and the secondary disturbances are under control, it is necessary to maintain the patients indefinitely thereafter on at least 5 to 10 times the maintenance amount for persons who have never been deficient.

Summary

Avitaminotic lesions of the mouth often reflect secondary endocrine disturbances related to impairment of hepatic function on a nutritional basis. The appearance of these lesions is thus of grave import for the general bodily health. Complete, intensive and persistent nutritional therapy not only cures the nutritional lesions but alleviates the secondary disorders by restoring healthy liver function.

55 East 86th Street

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*Aided by grants from Lederle Laboratories Inc., and The Upjohn Company.

**Reference may be made, for instance, to the excellent papers of Kruse[19] and of Roth[20] and the extensive review of Bodecker and Cahn.[1]

†The relation of nutritional deficiency to thyroid function is discussed elsewhere in more detail.[2]

‡The superiority of liver over yeast, for instance, in the treatment of chronic hypertrophic gingivitis, is illustrated in a case cited by Cahn[21] (previously reported by Martin and Koop[23] and by Bartels[24]). In this case, the administration of 6 teaspoonfuls a day of desiccated liver led to rapid regression of the gingival lesions. Substitution of granular yeast for the liver led to recrudescence of the gingivitis, which disappeared again when powdered liver was given, and remained healed so long as the latter was continued. As Cahn[21] states "This case illustrates what all nutritionists have learned, that liver supplies some fraction that yeast does not."

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STEERING TOWARD DENTAL HEALTH

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Steering toward dental health means steering toward general health as well with the same factors to guard. Data collected at the Guggenheim Dental Clinic since 1933 attest to this tie-in of tooth condition with the over-all well being of the organism. Thus, the routine instituted for the control and prevention of dental disease has led to improvement in other ailments. Several papers have been released; especially apropos are Dental Caries Control Within Our Reach —Journal of the American Dental Association 30:1508, 1943, and Dental Caries Control; A Paramount Factor in the Health Routine—Journal of Exceptional Children 5, 130, 1945. Many of the charts and tables presented are being used for distribution to dentists, physicians and teachers, and serve as models for patient instruction.

Essentially, the theme idea is correct living. Stress is laid on the following precepts:

1. Sound planning with striking saving of money and energy.

2. The use daily of the proper foods in correct proportion. For this purpose foods have been regrouped into five classes:

(a) Milk freshly pasteurized or equivalent evaporated or dried, for children three to four glasses, for adolescents four or more, for adults three.

(b) Cod liver oil as whole fish oil, one teaspoonful for everybody from one year of age, before that in graded amounts.

(c) Vegetables and fruits are interchangeable according to market availability. They should be used mostly raw and in this form should always end the meal. All leaves of all vegetables except rhubarb are edible—the tougher outer ones in soup, meat pies, stews. Potatoes can be rightfully replaced only by root vegetables like beets, carrots and turnips, or for low caloric need by leafy vegetables. Corn, macaroni, spaghetti, rice or other grain products can thus be avoided.

(d) Solid non-vegetable, non-fruit foods should come primarily from eggs, fish or meat for low caloric requirements with choice from cheese, whole grain bread, whole grain cereal and certain legumes added and commensurably increased as the level rises. At all times, through adolescene, there should be only one portion of this group to 1.5 or 2.0 portions of the vegetable-fruit varieties. During adulthood, the ratio is varied from 1.0 to 1.5.

(e) Water, a most important food for optional nutrition, induces a habit forming need and should be regularly developed from early childhood. One 8 ounce glass is added to the daily intake at each birthday until the age of six years, then kept so throughout life.

With balanced nutrition unequivocal and cost paramount in planning it, substitution of any of the foods listed by sodas, ice cream, candies, cookies and cake become inconsistent. Such products are low in desirable nutrients, divert funds from these foods, satisfy hunger by overdistending the gastric lumen so that the appetite for necessary food is thwarted.

Soda concoctions are really expensive beyond the actual outlay of money which can be used for milk, fruit juices or whole fruit. Hygienic water is now provided as a public service in an ever increasing number of communities so that using sweetened carbonated or phosphated beverages multiplies manifold the cost of genuine water. In addition, such drinks are apt to be otherwise harmful, especially for teeth, due to their free acidity. It would be well to note the work recently published in the Journal of the American Dental Association 32: 608, 1945, on this subject.

Sugar (not only pure, but as cookies, cakes, candies, ice cream) dilutes the diet with empty calories which substitute calories from really essential foods and thereby deprives the body of vitamins, minerals, good proteins, carbohydrate

and fats. Actually, too, sugar, cookies, cakes, candies and ice cream increase the need for calcium, phosphorus, iron, thiamine, riboflavin and niacin. These are required for the normal oxidation of sugar and so their deficiency is made more acute. Reference to the Journal of the American Medical Association 125: 738, 1944 will supply additional details. Still further, sugar, cookies, cakes, candies, ice cream are deleterious locally to teeth susceptible to decay.

None of these can be assigned a true role in the daily intake. Ample carbohydrate and fat is obtained along with all other nutrients from intelligent choice of foods. Menus with such provision are regularly formulated in the Guggenheim Dental Clinic routine. Most significant in attaining the goal in reeducation—active realignment of ideas not only of children in elementary and secondary schools or of college students, or even of patients, but also of teachers, nurses, physicians and dentists whether at work or at home. Practicing the ways proposed to those seeking advice establishes a degree of confidence otherwise difficult to attain.

3. Regular and sufficient rest—enough to take one through the daily tasks, including recreation without feeling tired—14 hours or more below six years, at least 12 hours thence till 12 years, 10 throughout adolescence and not fewer than 8 hours during adulthood.

4. Abundant fresh air during work, play and sleep.

5. Chasing germs with cleanliness.

6. Regular annual medical check.

7. Regular dental examination every six months.

8. Securing information from authorized sources—the Physician, Dentist, School, Health Center, Dental Clinic, American Medical Association, American Dental Association.

9. Planning for health and saving the cost of sickness.

To conclude we must rely less on proprietary preparations—locally applied and internally administered medicaments. To be sure therapeutic agents may give immediate relief but at best can be viewed only as temporary benefactors. The use of fluorine, Vitamin K, ammonium compounds for alleviating dental caries, are timely examples. Thus, fluorine employed topically on teeth or taken through water and bone meal has apparently reduced decay. However, none of the studies have reported relieving systemic malfunction along with improvement in the dental condition. Combined results are obtained when the total physiological picture is borne in mind.

In a recent check, 50 percent of 200 cases varying in the degree of their adherence to nutritional recommendations showed improved dental status, 80 percent derived both systemic and dental benefits.

422 East 72nd Street

THE EFFECTS OF PREGNANCY ON THE SOFT TISSUES OF THE MOUTH

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INTRODUCTION

Pregnancy is a physiologic state which is accompanied by manifestations very closely approximating pathological reactions. It is a period during which the prospective mother exhibits numerous symptoms of extreme metabolic, endocrinologic, and psychic imbalance. To use the very appropriate words of William Wolf: "The bodily changes which take place at that time affect practically every part of the organism and place a physiologic strain upon the mental as well as the physical makeup of the woman who must for humanity's sake go through this ordeal".

The changes occurring in the soft tissues of the mouth are varied and may be said to be present, in some form, in roughly 55% of all pregnancies. It is very important for the dentist to recognize these changes, and to be able to render a correct diagnosis differentiating them from the more serious pathological lesions which may be well simulated. There is probably no specific danger from the oral lesions of pregnancy per se; however, in the absence of complete differential diagnosis, the gravity of the condition may be overestimated and treatment of a nature may be instituted which will increase the patient's troubles rather than alleviate them.

The mouth is an ideal theatre, both anatomically and physiologically, wherein the drama of the systemic imbalance of pregnancy may be presented. The anatomic fact is that within the mouth, particularly in the loose areolar tissue posterior to the third molars, there are quite a few accessory salivary glands which histologically closely resemble the glands of Bartholin in the vagina. The physiological result is that these similar glands are affected in a very similar way by the ovarian hormone estrin, with the result that they and the tissue surrounding them become edematous. During pregnancy there may be a change in these glands, so altering the tone and immunological defenses of the tissues that an infection will be initiated by an invasion of the ever present oral bacteria. The outcome may vary from a simple inflammatory process to frank ulceromembraneous lesions.

The duration of pregnancy is usually about 280 days, as counted from the first day of the last menstrual period to the day of delivery; however, this may deviate from 8-11 days, usually tending to lesser rather than greater duration. It usually follows the duration of the menstrual cycle, being longer in women whose cycle is longer and vice-versa; in fact from the viewpoint of hormonal changes, menstruation may be looked upon as a miniature pregnancy. The period of pregnancy is usually divided into trimesters of approximately three months each, the oral soft tissue manifestations appearing as a general rule during the second trimester and continuing until term; whereupon, in the absence of complicating conditions they resolve completely, reappearing with subsequent pregnancies.

DESCRIPTION OF THE MANIFESTATIONS

The soft tissue manifestations in the oral cavity produced by pregnancy have been classically divided by Daniel E. Ziskin into five general groups, to which as a whole he has given the name "pregnancy gingivitis". To these a sixth manifestation should be added, the so-called "pregnancy tongue" described by Frederick S. Franck. In describing the various manifestations, it must be borne in mind that they do not necessarily follow each other, and are only divided as to the severity of symptoms elicited with no relation as to the time of occurrence other than that they usually appear during the

second trimester. One type only may be present or all types may appear during the period of the pregnancy.

The first type and by far the most common form of "pregnancy gingivitis" is characterized by bleeding of the gingival tissues, the patient complaining of the so-called "pink toothbrush" and hemorrhage when hard foods are eaten. In truth the entire oral mucosa may be hyperemic and have a deeper reddish hue. On questioning, the patient will usually connect the onset of this condition with her pregnant state, or if present before, she will have noticed an exacerbation of symptoms after she became pregnant.

The next recognizable form is characterized by a slight change in the interdental papillae, which loses its stippled appearance and appears glossy. Even in the first few months there may be an almost microscopic proliferation at the apex of the papillae, and it is said that some older practitioners with excellent clinical senses are able to tell pregnancy by this slight sign with almost unfailing precision. However, there is usually more edema with a blunting of the papillary pyramid and the papilla itself assumes a mildly puffed appearance with a change in color from a healthy pink to an old rose. Thus it can be seen that with this type of manifestation the changes may either be so slight as to be easily overlooked or gross enough to be readily discernible.

The third type of "pregnancy gingivitis" involves as a rule only the free gingival margin, which assumes a raspberry color and is assigned the descriptive term "raspberry red gums". The condition is confined to one or several teeth generally in the anterior region; however, other locations may be involved. The gingival tissues in the elected site are thrown up into two or three small peduncles of the characteristic color which bleed very easily and often cause the patient great concern. Generally this condition becomes more and more annoying as gestation proceeds, rapidly disappearing after parturition.

The fourth oral soft tissue manifestation of pregnancy is characterized by a generalized gingival hypertrophy, which in all cases bleeds easily and is seldom if ever painful; this is the hypertrophic gingivitis of pregnancy. With this type the gingival tissues may present varied types of reactions, particularly apparent in the interdental papillae. In some cases the papillae become noticeably enlarged, losing their normal contours, due in part to edema but also to hyperplasia of the epithelium, and often a proliferation tissue appears which emerges from the undersurface of the papillae and may grow over and cover part of the coronal portion of the teeth. As this proliferation continues, the normal gingiva is pushed back, resulting in a blanched line of demarcation. The interdental papillae may reach such size as to appear as epulides with pedunculated bases. In other cases the proliferation begins beneath the surface of the free gingival margin, spreading along the sulcus and covering a portion of the tooth without involving the papilla. Less frequently there is the formation of a "pseudopapilla" which does not involve the interdental papilla and is the same color as the surrounding gingival tissue, but is separated from it by a definite horizontal line forming a cleft. The amount of inflammation in all types of hypertrophic gingivitis is determined by the presence and degree of outside irritation, the color of the gingivae varying accordingly from an old rose to a bright red. As a general rule the teeth spread, become loose and tend to elongate, apparently due to a loss of alveolar bone. Working from this point, hypertrophic gingivitis may be thought of as a compensatory mechanism of the body, which proliferates the soft tissue in an attempt to give additional support to the loosened teeth (Miller).

The fifth and most startling oral soft tissue manifestation of pregnancy is the so-called "pregnancy tumor" as named by Theodor Blum. This manifestation is by far the least common, occurring in about 2% of all pregnancies.

The pregnancy tumors have been classified with the epulides, which may be divided into three general classes or types (Prinz & Greenbaum); the fibrous type, the angiomatous type, and the giant-celled type. At this point it may well be noted as a reminder that the term epulis is a rather vague one which means literally, a growth on the gingivae; whereas actually most epuli originate from the periostium or periodontal membrane. By far the majority of pregnancy tumors are of the angiomatous type; however, fibrous (simple hypertrophy) and giant-celled types have been reported during pregnancy. They may appear early and grow fairly rapidly during the course of the pregnancy.

Clinically as to location, the "pregnancy tumors" exhibit a predilection for an interdental papilla in the upper anterior region; however, they have been found in the posterior region between the bicuspids and molars and in the lower anterior region. One case has been reported (Blum) of a "pregnancy tumor" on the mucous surface of the lower lip. Microscopically this manifestation appears as an overgrown papillary mass which is usually either mushroom shaped or lobulated. It is characteristically bluish-red to blue in color where it is covered by epithelium, depending on the vascularity, the amount of venous stasis, and the size of the pedunculated attachment; while the ulcerated portion, where it is subjected to trauma, shows either a desquamated raw bleeding surface, or is covered by a grayish necrotic membrane. The mass is usually firm but as the result of some internal degeneration, it may be soft and flabby and bleed easily upon palpation. The tumors vary in size from 1-2 centimeters in diameter, and the smallest in size are invariably attached to the gingival pyramid. Pain is rarely a symptom, hemorrhage, disfigurement, and discomfort being the most frequent and important complaints.

Roentgenographic study of "pregnancy tumors" is characteristically negative, and due to this fact, the roentgenograph is of importance in differential diagnosis from conditions as the peripheral giant-celled tumor (epulis?) in which there is destruction of the alveolar bone. In rare cases the roentgenograph may reveal slight destruction of the spongiosa and the peridental lamella with separation of the teeth. However, if any appreciable destruction of alveolar bone and separation of the teeth exists in a case of indisputable angiomatous epulis occurring at pregnancy, it will be found that there is a history of previous trauma in the particular region.

Microscopically a biopsy section of a typical angiomatous "pregnancy tumor" shows that the mass is made up of numerous engorged capillary blood vessels. The space between the capillaries is filled with peripheliial cells which normally cover the endothelial lining of the capillaries. These cells show active proliferation, some of them remaining on the vessel walls; they are undifferentiated mesenchymatous and show numerous mitotic figures. There is usually no sign of inflammation except near the outer margin, where inflammatory cells appear just below the ulcerated surface. The typical "pregnancy tumor" does not contain the three different portions of an epulis, namely the granulomatous, the vascular, and the fibrous portion (Blum). In the fibrous type the microscopic picture of numerous capillaries is the same however, there are portions which show a marked fibrous nature. The etiology of the "pregnancy tumors" is vague; however, it seems very certain that the general endocrinologic, metabolic, and psychic unbalanced, even if not directly etiologic factors, serve as definite predisposing causes. A very distinct myxomatous degeneration may be found in most "pregnancy tumors", pointing very strongly to an endocrine dysfunction as an etiologic factor.

The actual exciting causes are such factors as malocclusion, local areas of poor hygiene, and trauma and it may be said that these tumors will be found in by far the greatest number in areas of irritation or infection.

Surgery or a combination of surgery and actual cautery are the methods of

choice and treatment. Excellent results are obtained in many cases with large therapeutic doses of ascorbic acid (300-500 mg. per day), thorough prophylaxis, mouth hygiene, and massage and gingival stimulation. However, many cases of "pregnancy tumors" disappear spontaneously, as they appeared, with parturition; but conversely many cases persist after parturition or tend to recur with subsequent pregnancies, therefore surgical removal coupled with removal of all possible sources of irritation or occlusal dysfunction seems to be the most logical approach to thorough and lasting eradication of this most annoying and disfiguring oral soft tissue manifestation.

To the above a sixth oral manifestation of pregnancy may be added; this is a condition of the tongue described by Frederick S. Franck, which he has termed simply "pregnancy tongue". According to Franck this is rare manifestation occurring in only 12 out of 2,217 pregnant women examined by him. The condition appeared very much like the "geographic tongue" and often appeared indistinguishable clinically from this better known condition. The "pregnancy tongue" appeared in the second half of pregnancy, gradually became more pronounced, and reached its zenith at the end of gestation. In all cases improvement was noticed immediately after parturition, complete resolution taking place in from six to twelve days post partum.

The objective symptoms are of the character of a rash which begins on the dorsum of the tongue as a small patch or patches wherein the filiform papillae disappear. The patches spread like a ringworm infestation, and excoriation seems to take place in the enclosed areas which vary in color from bright pink to bright red. These areas coalesce and show a scalloped margin. The lower aspect of the tip shows white epithelial streaks, which cannot be rubbed off, running parallel to the frenum. The appearance is changeable; it remains constant for days, or it may change radically within a few hours.

Subjectively the symptoms, if present at all, are very mild, usually being limited to a burning sensation when hot or spicy foods or sour citrus fruits are taken into the mouth. The senses of taste and touch are unimpaired.

"Pregnancy tongue" is probably but another manifestation of the systemic imbalance of the pregnant state. The bacteriological picture showed no dominance of any specific organism though all types of oral flora were present, and the blood counts though not always normal could not be connected clinically.

The importance of this condition lies in the fact that it must be differentially diagnosed from pathological conditions which are of serious importance, and to prevent the development of a carcinomaphobia in the patient. The patient is told to use bland, soothing mouth washes and to avoid spicy foods. If the excoriated areas are tender, an analgesic ointment may be prescribed.

ETIOLOGICAL FACTORS

The specific etiological factors of the oral soft tissue manifestations of pregnancy are vague; however, it is certainly true that the predisposing causes may be found in the extreme imbalance of the metabolic, endocrinologic, and psychic mechanisms of the mother at this time. It has been suggested that the exciting causes lay within the mouth itself in the forms of excessive occlusal trauma, calculus, poor hygiene, etc. If this be assumed, how is one to account for the manifestations presented in mouths wherein no local cause or rather aggravating influence can be found? It is my belief that though local irritating factors, as those stated above, will most certainly exacerbate any symptoms that otherwise may go unnoticed, these same factors are not a prerequisite for the appearance of the oral manifestations in pregnancy. As has been said, "The metabolic, endocrinologic, and psychic disturbances are closely interrelated, and it is therefore extremely difficult to attempt a description of any of them as separate and complete entities exclusive of the controlling influences exerted by the others." Hence it must be borne in mind as these various disturb-

ances are described, that the increased metabolic activities are influenced by the hyperfunction of the endocrine glands, that the metabolism more or less governs the functional increase in the endocrine glands, and that these are both to a large extent under the guidance, we may say, of the psyche of the expectant mother.

The metabolic changes occurring in the maternal organism during the period of pregnancy are due partly to the metabolic demands of the fetus, and partly to the changes in the intermediate metabolism of the mother herself incident to the pregnant state. During the early period of pregnancy the metabolism of the mother is more or less within normal limits; however, as the course continues there is a steady increase in all metabolic functions. The basal metabolic rate is continuously elevated and may reach an average value of plus 30 at term, the slow steady rise following closely the increased thyroid activity. There is a reduction in protein metabolism and a positive nitrogen balance, from the fourth month forward, due to a fall in the specific dynamic action of protein; the resulting protein nitrogen retention is four times the amount which can be utilized by the fetus during the later months of gestation. The consumption and retention of fat are increased during pregnancy, and beginning about the third month a physiologic hyperlipemia exists along with a hyperlipoidemia and hypercholesterolemia. These conditions become more marked as pregnancy progresses, and just before parturition the total plasma cholesterol has reached an average increase of 25% with a concommitant increase of cholesterol in the adrenal glands. Though there is a decreased sugar tolerance during the period of pregnancy, the blood-sugar level rising from a normal of 70-110 mg. per cent to 190-200 mg. per cent after the ingestion of 100 grams of glucose, it is considered physiologic since the figure returns to normal within the usual time limits; also a physiologic glycosuria occurs in 10-15% of all normal pregnancies and is probably due to a lowering of the renal threshold level. The deranged carbohydrate metabolism leads to defective oxidation of fats with the resulting increase in diacetic and beta oxybutyric acid formation and excretion.

The two remaining metabolic disturbances of pregnancy to be discussed are more significant in that they bear a closer relationship to the lesions of the oral soft tissues; these are the acid base balance and the mineral metabolism.

Beginning usually in the second month of pregnancy there is a steady and progressive decrease in total serum base constituting a state of acidosis. It must be remembered that acidosis is not the occurrence of an acid reaction of the blood or tissues, nor does it imply even the slightest reduction of the normal alkalinity as measured by the hydrogen ion concentration, but it is a diminution in the reserve supply of fixed bases in the blood and tissues of the body, the physicochemical reaction of the blood remaining unchanged except in extreme conditions (Sellards); practically, it may be considered a decrease in the titratable alkalinity of the blood and tissue fluids. It is believed by most investigators that the acidosis of pregnancy with its resulting ketosis, is due to a primary base deficit, which is indirectly aggravated by the deranged carbohydrate metabolism (the formation of diacetic and beta oxybutyric acids through defective oxidation of fats). However, regardless of its cause, the depletion of the supply of fixed bases reduces the capacity of the blood to carry CO^2 resulting in an accumulation of CO^2 in the tissues, thereby blocking the processes of oxidation so that the individual suffers from asphyxia exactly as if deprived of air. The acidosis of pregnancy is mild in the great majority of cases, but it can be seen that in highly vascular and easily congested tissues, as the gingivae, it would be possible and in fact probable that a congestion and resulting tissue asphyxia may come about presenting the clinical picture of edematous, blue-tinged, turgid gingivae.

Calcium and phosphorus are retained by the maternal organism in greater amounts than are needed for the satisfaction of fetal demands; however this fetal drain causes a diminution of the

maternal blood calcium and a demand on the calcium deposits of the mother's body, unless the necessary increases are provided by the diet. As a note of explanation of this seemingly confusing situation, normal calcium metabolism may be briefly explained. The calcium taken into the body in the diet is dissolved in the acid fluids of the stomach and the upper part of the small intestine, absorption into the blood stream taking place chiefly from the latter. There are two types of calcium present in the blood, the diffusible form and the non-diffusible form, which combined are equal to 9-11.5 mg. per cent; of this total diffusible calcium equals from 50-70 per cent. The greatest part of the calcium of the diet is converted to ionic calcium, with only a very small portion remaining unionized. In normal pregnancy the total serum calcium is slightly lowered, the fractions being altered such that there is a slight increase in the amount of diffusible calcium but a pronounced decrease in the non-diffusible fraction. The increase in diffusible calcium is recruited from the maternal storehouses if not supplied by the diet. The non-diffusible calcium seem to be bound essentially to serum albumin and its decrease may be due to the mild albuminuria which may exist during the pregnant state. Since ionic calcium maintains the permeability of cellular membranes and the state of excitability of all tissues, it can be seen that a breakdown in these factors due to lowered serum calcium may cause an edema, and loss of tone in the gingival tissues. Also a breakdown of the pericemental tissues, as described by Box, in which alveolar bone is destroyed and supplanted by a fibrillar connective tissue may occur. To use Box' words, "While occlusal trauma seems to serve as the main factor in the localization of the lesions of this type, certain conditions in which the body is being robbed of its normal supply of calcium seem from a clinical standpoint, to accelerate the process of rarification".

Very few studies have been made of the other minerals in pregnancy; however, it is known that there is a retention of both sodium and phosphorous along with magnesium and sulfur, and a lessened excretion of other elements required by the developing fetus.

THE VITAMINS

It is opportune at this point to discuss the relation of the vitamins to the oral soft tissue manifestations of pregnancy because of the very close connection existing between the metabolic imbalance, the vitamins, and the endocrinologic and psychic upsets present at this time. In fact the vitamins seem to occupy the unique and important position midway between the metabolic and endocrinologic functions, acting the twofold role of coordinator and activator of these functions. Perhaps the most satisfactory method of procedure will be a short discussion of each of the vitamins, its oral deficiency symptoms, its relationship with the hormones and metabolic activities, and a correlation of these with the pregnant state.

Vitamin A, a fat soluble vitamin, is ingested mostly as its precursor or provitamin, carotene, in which form it is absorbed from the intestine, in the prescence of bile, and converted into vitamin A by the Kupffer cells of the liver wherein about 95% of the body reserve is stored. A deficiency of this vitamin will produce keratinization and hypertrophy of the gingivae, and in addition, is said to produce a slow, non-healing, recurring necrotic gingivitis when associated with local mechanical irritation (Sinclair). Vitamin A has a definite synergistic action with the growth hormone of the pituitary gland, and also probably acting by way of the pituitary, vitamin A is necessary for the correct functioning of the gonads. A prolonged lack of the vitamin renders the adrenals atrophic, and there is some measure of antagonistic action toward the thyroid. On the other hand there is little substantial evidence that deficiencies of this vitamin significantly disturb the metabolism of proteins, fats, or carbohydrates. During the pregnant state, a marked deficiency of vitamin A will commonly result in intrauterine death and resorption of the fetus by necrosis and infection of the

maternal decidua (Wolf). It is a portion of the role played by vitamin A to maintain the integrity of the epithelial lining of all mucous membranes; during pregnancy the required daily intake is increased from a normal requirement of 1500 international units to 9000-12000 international units; therefore, a deficiency may well exist with resulting oral manifestations as described above.

Vitamin B^1 or thiamine is a water-soluble vitamin, and is usually ingested in sufficient quantities with the food to maintain the normal daily requirement of one milligram. It is absorbed readily from the bowel and is possibly converted into a pyrophosphate ester by the blood cells which carry it to the various tissues. The storage capacity of the body is limited due to the ready excretion of this substance by the kidneys; however temporary storage occurs in the liver and the muscles. The oral deficiency symptoms of vitamin B^1 are; neuralgic and other more vague pains in and about the mouth, predisposition to "dry socket" following extractions, and possible apthous and simple herpetic lesions of the lips and oral mucosae. Thiamine is both synergistic with and antagonistic to the thyroid, it is synergistic with insulin, and is necessary for the correct secretion of prolan by the pituitary; and also, contrary to the action of vitamin A, a deficiency of vitamin B^1 results in hypertrophy of both the medulla and cortex of the adrenal glands. Vitamin B^1 is essential for the complete metabolism of carbohydrates, it increases the utilization of protein, and probably most important from the metabolic standpoint, it increases the appetite. Pregnancy increases the daily requirement of thiamine four-fold, and if present, a deficiency could produce the frequent vague pains about the mouth and teeth complained of at this time; also the so-called ulcers ordinarily attributed to gastric upsets may result. In truth the latter are probably due to the digestive upsets, but not in the usually accepted sense of the word, as there is nothing wrong with the digestive system or the ingested food except its poverty of vitamin B^1.

Wiggers states that the term B^2 merely serves as a catalogue character for a whole group of substances, the best known ones being riboflavin, niacin, pantothenic acid, pyrodoxine (B^6), choline, biotin, inositol, folic acid, and para-amino benzoic acid. Of this group, by far the most important in relation to oral soft tissue manifestations are riboflavin and niacin; particularly the former may be found deficient during pregnancy, as the more enormous amounts required may not be adequately supplied by the diet.

Both riboflavin and niacin are water soluble vitamins which are widely distributed in natural foods. In the case of riboflavin, there is a tenacious storing in many organs following absorption from the blood stream. In the mouth a deficiency of both of these B complex components manifests itself as a glossitis. In the case of niacin, the tongue is devoid of papillae, scarlet red in color, corrugated in appearance, and covered with painful ulcers in all stages of developing and healing; these ulcers may also be found on the oral mucosa. The glossitis of riboflavin deficiency is essentially the reverse condition in that the tongue is a magenta or purplish-red color and the fungiform papillae are prominent, edematous, and mushroom-shaped, giving a peculiar granular appearance to the dorsum of the tongue (Burket). In addition, cheilosis and cracking at the corners of the mouth may be an early symptom of a riboflavin deficiency. A marked deficiency of these important B complex factors may be the cause or at least a prominent contributing factor in the production of the "pregnancy tongue" as described by Franck.

Though quite a bit is known about the other components of the B complex system as enumerated above, at least in relation to the comparatively short time their importance has been recognized, the relationship between their deficiencies and oral manifestations is still in the stage of theory and experimentation. Experimentally it is said by some that pyridoxine deficiencies have resulted in oral lesions and cheilosis. A connection between

dental lesions and pantothenic acid deficiency has not been successfully proven though experiments have been conducted to establish such a connection. The possibility and probability that each of these factors do manifest their deficiencies in the oral cavity definitely exist, but until proven facts are presented they must remain as possibilities and probabilities.

Vitamin C or ascorbic acid is a water-soluble substance which is found in the various citrus fruits as the greatest natural source. After absorption from the small intestine it is stored to some extent in the adrenal and pituitary glands and the corpus luteum, particularly in the mature state of the latter, decreasing during its involution. Vitamin C must be ingested daily to avoid the development of deficiency symptoms, with a daily minimum requirement for normal adults of 50-100 milligrams. The oral symptoms of a deficiency of ascorbic acid are hypertrophy, sponginess, and bluish-red color of the gingival tissues with increased susceptibility to secondary infection; the teeth may become loose and in severe cases exfoliated. Vitamin C is antagonistic to the thyroid, and definitely effects carbohydrate metabolism increasing the utilization of glucose from the blood. Symptoms of vitamin C deficiency rarely develop during pregnancy possibly due to the amounts stored in the corpus luteum; however it is an interesting fact to note that the decrease in this vitamin at the beginning of involution of the corpus luteum exactly parallels the decrease of progesterone, and any oral effects produced may possibly be caused by a decrease of both of these substances and the resultant lessening of the inhibitory effect on estrin. This possibility is debatable, however, and much speculation both pro and con has been made by authoritative sources on the subjects of nutrition and endocrinology.

Vitamin D is a fat-soluble vitamin not widely distributed in natural foods, the most potent sources being fish, liver, salmon, sardines, and tuna. Ingested vitamin D is absorbed in the presence of bile salts and very tenaciously stored in the liver. Oral manifestations of its deficiency are a red marginal gingivitis probably indicative of alveolar resorption beginning at the crest (Miller). Vitamin D is definitely related to the metabolism of calcium and phosphorous; it aids their absorption from the digestive tract, causes their retention and concentration in the body, and their deposition in the bones and teeth. A deficiency also results in generally enlarged and hyperplastic parathyroid glands, possibly as a compensatory reaction for the lack of help received from the vitamin as an intermediary between them and calcium metabolism (Wolf). Normal adults require about 135 International Units daily, but during pregnancy this value is increased to from 400-800 International Units, and if this amount is not provided by the diet and extra calcium and phosphorous are not supplied to meet the added requirements, there may be an enlargement of the parathyroid glands and a decalcification of the alveolar bone with resultant loosening of the teeth. This loosening may initiate traumatic occlusion and gingival or periodontal involvement; or it may extremely aggravate any other oral manifestations of pregnancy which are present. Thus a vitamin D deficiency may either cause oral manifestations directly, as the reddened gingival margins, or indirectly through a resultant alveolar decalcification as just described.

The remaining vitamins E, P, and K have not been definitely shown to bear any relation to oral soft tissue manifestations of pregnancy. However, experiments have been conducted utilizing vitamin K in its anti-hemorrhagic capacity in combatting persistent bleeding in icteric patients. Some work has also been done with additions of vitamin P to doses of vitamin C in therapeusis of chronic periodontal conditions with indefinite results, but it seems from all material available that the action of vitamin C is enhanced by the vitamin P. So as with most of the vitamin B complex, we must recognize the possibilities and await their proof.

THE ENDOCRINE GLANDS AND HORMONES

The hormones are chemical agents secreted, or better increted, by the cells of the endocrine glands into the lymph and blood streams, by which they are transported to their specific areas of action. It is probably of interest to note at this point that no single hormone (with the possible exception of the growth hormone of the pituitary) or endocrine gland acts wholly by itself at any time; the effects are produced through an interplay of several, a so-called "endocrine ensemble".

The pregnant state brings into hyperfunction a unique "endocrine ensemble", consisting of the pituitary, the thyroid, the parathyroids, the ovary, and the adrenal glands and the islet cells of the pancreas. In addition to these permanently present glands, there exists during pregnancy a temporary one, the placenta, which is considered by some authorities to possess an incretory function and by others to serve only as an organ of storage.

The pituitary gland is a small body (weighing about 0.6 gram) lodged in the floor of the sella turcica, and thereby shielded from the outside world. The gland consists of three lobes; the anterior and the posterior lobes and the pars intermedia, attached to the brain stem by the stalk or infundibulum. The anterior lobe is truly glandular and by far the most important portion of which Wiggers says, "The effects on other endocrine glands and further modifications of bodily functions and structures through changes so induced are far reaching and justify designating the anterior pituitary portion the master or moderator of the whole endocrine system". Of all the glands, the pituitary shows the most definite and pronounced changes during pregnancy, particularly the anterior lobe which may become two and one-half its normal size with greatly increased secretory activity, large amounts of gonadotrophic hormone appearing in the blood and urine.

The thyroid gland, consisting of two lateral lobes joined by an isthmus, is located on the anterior surface of the larynx and the trachea. It is an extremely vascular organ which is completely surrounded by a capsule. In 50-90% of all pregnancies the thyroid gland becomes definitely enlarged, though rather than hypertrophic the enlargement may be merely vascular. In addition the functional activity is increased beginning about the third month, probably under the influence of the increased pituitary function. In the latter months of pregnancy the thyroid activity may be depressed again, probably due to the depressed pituitary function as influenced by the excess estrin present at this time.

The parathyroid glands are four small bean-shaped structures situated on the posterior aspect of the thyroid gland. They are arranged in pairs, a superior and an inferior pair, the superior being the most constant in position, with the inferior often eccentrically located and may even be imbedded in the substance of the thyroid gland. Frequently accessory islands or nodules of parathyroid tissue are found in the capsule of the thyroid, along the trachea, or in the thymus gland. All together the parathyroids weigh less than one-half a gram. During pregnancy the glands become more vascular and edematous with a slight relative hypofunction (Wolf).

The ovaries are a pair of bean-shaped organs each of which reposes in a depression in the lateral wall of the pelvis, the fossae ovaricae. Each ovary is divided into cortex and medulla, the former containing the graafian follicles, within which the ova are formed and liberated during the menstrual cycle. From the follicle and from the corpus luteum remaining after ovulation, estrin or estrogenic hormones are produced. Also from the corpus luteum progesterone is produced. The third hormone increted by the ovaries is the substance termed relaxin which is but vaguely established, and probably bears no connection to the oral soft tissue manifestations of pregnancy.

The adrenal glands are a pair of pyramidal shaped structures situated on the upper pole of each kidney and hollowed out below to fit the kidney convexity, giving a characteristic cocked-hat appear-

ance. In truth the adrenals are really a combination of two distinct organs, the cortex and the medulla, within a single capsule. The cortex is of the most importance to this paper because of its direct relation to the pregnant state even though the exact function is not definitely known. However, it must not be considered that the medulla is unimportant, as it is from this portion of the gland that the substance adrenalin is increted in excess amounts in periods of great stress (Cannon); and even though the medulla is considered by many investigators as not necessary for normal life, there is too much evidence in favor of Cannon's theory to cast it aside completely. During pregnancy the adrenal cortex is increased in size and greater amounts of the cortical hormone are liberated, without which death of the fetus or its abortion may take place.

The pancreas is a soft yellowish-grey structure possessing both an internal and an external secretion, lying across the abdomen from the loop of the duodenum to the spleen. Embedded within the substance of the pancreas are the islets of Langerhans which constitute the endocrinologic portion of the gland, and increte the hormone insulin which controls to a large extent the metabolism of the carbohydrates. Although showing no anatomic or histologic changes during pregnancy, the functional activity of the pancreas is undoubtedly disturbed, together with that of the pituitary, the thyroid, and the liver, interfering to a greater or lesser degree with the absorption, storage, mobilization, and production of sugar (Wolf).

The placenta is formed during the period of nidation, partly of the trophoblastic cells of the fetus and partly of the maternal decidual cells. The placenta is fully formed during the third or fourth month of pregnancy and resembles the intestinal villi both in structure and function, with the additional capacities of an excretory, respiratory, and hormonal function; it also serves as a storage organ for carbohydrate and fat, supplementing the liver. Recent investigations have proven that the placenta acts as a temporary endocrine gland, producing large quantities of estrogenic substances and an anterior pituitary-like hormone. Also it is believed that the placenta forms progesterone after the cessation of this function by the corpus luteum.

To recapitulate briefly, the hormones generally accepted as bearing a direct relationship to pregnancy are: the gonadotrophic hormone of the anterior pituitary, thyroxine of the thyroid, the parathyroid hormone, the adrenal cortical hormones, insulin of the islets of Langerhans, and estrogen and progesterone of the corpus luteum and placenta. Most evidence points to the fact that these hormones, though they directly affect the course of pregnancy, are indirect causal factors of the oral soft tissue manifestations elicited by the pregnant state, these manifestations being the result of the hormonal action on other bodily processes, rather than the effects directly produced by the hormones themselves on the oral soft tissues. In fact, despite experimental evidence and theoretical statements of modes of action, the true mechanisms by which the greatest majority of hormones act remain cloaked in mystery. Estrogens and progesterone are at present thought to be the offenders during pregnancy, but in this also we find differences of opinion from authoritative sources. Some believe the huge increase in estrogen at this time is the cause, but others have failed to induce oral symptoms by prolonged administration of large doses of estradiol and diethylstilbesterol to many women and therefore consider that increased estrogen plays a primary role with the large amounts of progesterone as the exciting factor. Until something more is known about the true action of the hormones, we must be satisfied with the generally accepted belief that these substances and the glands producing them play a large part in the production of the oral manifestations of pregnancy, probably in connection with the other physiological and psychic disturbances existing at this time.

PSYCHOSOMATIC ASPECTS

According to the psycho-analytical theories all deviations from normal physi-

ology are due to or can be traced to a disturbance at some level of the unconscious mind. Though most of these theories are very plausible and though many of them have in fact been proven, it is greatly beyond the scope of this paper to attempt a discussion of all manifestations possibly originating from the psychic disturbances existing during pregnancy. Suffice it to say that a large portion of the psychic unrest and mental tension existent at this time may be attributed to the increased irritability and strain on the autonomic nervous system and emotions producing as a result the so-called state of hyperthymia.

The oral soft tissue manifestations of pregnancy cannot be directly attributed to the mechanisms of the psyche, rather they are the terminal results of its effects on the endocrine glands and the metabolic processes, which in turn affect capillary function in the soft tissues of the mouth. The disturbances in capillary function result in progressive loss of tone of the oral tissues, and an extreme weakening of their resistance both to the irritational factors normally tolerated by them, and to invasion by infecting organisms which normally maintain a symbiotic relationship with them.

In truth, it is highly possible that the edema, the color change, and even the hypertrophy of the "pregnancy tumor" may be the direct result of disturbances of normal capillary function. Many factors may cause localized edema by a direct dilating action on the capillaries (anoxia, histamine, changes in pH and altered balance of K and Ca ions). The peculiar susceptibility of capillary endothelium to lack of oxygen, even for very short periods, is a well established fact; they become permeable to proteins, supposedly due to the formation of carbon dioxide and some metabolite during the period of anoxia, resulting in capillary dilatation and the clinical picture of swollen, congested gingival tissues. The pregnancy tumor as has been stated previously, is an angiomatous epulis, and it can be shown how they may be the result of localized capillary dysfunction. Changes in the postarteriolar vessels result in changes in size and number (in use at a given time) of the capillaries, thus a relaxation of the former may cause such an increase in number of the usually dormant capillaries, as to result in a tumor-like mass or swelling of the tissues in the affected region, to accommodate the increased volume of blood contained in the greatly increased number of capillaries.

The excessive emotions result in many cases of bodily change; this is an accepted fact, and is adequately borne out by many recorded case histories. As examples of the emotional control of capillary function we may mention the pallor of fear suddenly induced, the blush of shame or shyness, the reddish-purple of the face in fits of rage, and the outbreaks of gingival bleeding, as a result of excitement and some natural degree of fear, among the troops about to go into battle in the present war. Whether or not this is due to a disturbance in adrenalin secretion or whether the emotional upsets have a depressing effect on thyroid action, both of which situations are capable of affecting capillary function, or whether either of these is the guilty member is not known. And as a matter of fact, the exact mechanisms invoved in the production of any of the manifestations of psychoneurotic disturbance is vague and only the broadest theories of such mechanisms may be expostulated.

As a final thought on this subject we may say that the psychoneuroses, including those manifested by and during pregnancy, are not anatomical, physiological or chemical changes; they are not infections, or intoxications, or overstimulations. What are they? They are embodied in "Why man is unsuited to his world".

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A CASE OF PEMPHIGUS

HARRY ROTH, D.D.S., New York, N. Y.

Pemphigus is a disease of the mucocutaneous surfaces of the body that usually terminates fatally. It is characterized by vesicles and bullae which may have their inception in the mouth and may not manifest themselves in other parts of the body for months or even years.

Etiology

The etiology is unknown. It appears most frequently in Hebrews and is more common in women than in men. It is rarely seen in the young. The disease[2] has been transmitted from animal to animal by inoculation of the vesicular fluid and blood serum, but it has not been transmitted experimentally from one human to another.

Oral Symptoms

In pemghigus, according to Thoma[3], the mouth lesions first appear as a premonitory erythema. Next appear small bullae on the soft palate, buccal mucosa, pharynx and lips. These break down due to the action of heat, moisture, and trauma; a seropurulent exudate escapes and the lesions appear as red, painful, congested erosions covered by desquamated epithelium. New erosions constantly form and the entire mucosa, including the tongue, may be involved. There is profuse salivation, offensive breath, and soreness preventing mastication.

Differential Diagnosis

In the acute form pemphigus must be differentiated from erythema multiforme, drug eruptions, Vincent's angina, diphtheria, necrotic gingivitis and various allergic manifestations.

Nikolsky's sign in which the normal skin or mucosa of a pemphigus suspect is forcibly stroked with the finger tip or tongue depressor. The formation of a small bleb or the separation of the superficial layers of the stroked tissue constitutes a positive reaction.

The presence of extremely painful mucosal blebs or erosions associated with loss of weight, cachexia, nervousness and pruritis should indicate pemphigus.

Treatment

There is no specific remedy for this condition. Palliative treatment in the form of anesthetic troches, bland mouth washes, good oral hygiene and topical application of acriviolet 1% on the ruptured bullae is all that one can do for these cases.

Prognosis

Pemphigus is a skin disease usually terminating fatally. Death may occur within three or four weeks in the acute stage. The unrecognized prodromal erythematous state may precede the bleb formation by a few months. This would lengthen the course of the acute stage. The patient dies usually from some intercurrent infection due to his debilitated state.

CASE REPORT

History

Patient D.B. Age 34, white, married, female, pregnant five months, entered New York University College of Dentistry infirmary suffering from painful sore mouth. Upon questioning the patient stated that the lesion started on uvula and then spread to the floor of the mouth under the tongue. On the advice of her obstetrician, she used penicillin troches which were of no avail. She was then referred to her dentist who cauterized the lesion below the tongue. The mouth symptoms became worse. The lesions became more painful and spread to other parts of the mouth. The patient could

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2. BURKETT, L. W.: Oral Medicine. Phil. J. P. Lippincott Co. 1946.

3. THOMA, K. H.: Oral Pathology, St. Louis, The C. V. Mosby Co. 1941.

not eat any solid food and hardly any liquid nourishment. She was extremely nervous and complained of bilateral cervical and submaxillary lymph adenopathy.

Examination (clinical)

The lesion on the floor of the mouth under the tongue Fig. 1 had been cauterized by her physician and was not typical. The newly created eschar was superimposed on the broken bleb which was painful to touch. There were other areas in various stages of formation throughout the mouth. One was observed at the junction of the hard and soft palate Fig. 2 and another opposite the first molar Fig. 3 situated in the mucobuccal fold. The patient experienced a great deal of pain upon opening her mouth. Retraction of the lips to take photographs also elicited a great deal of pain.

The eroded areas were white, raised and surrounded by an area of redness. Upon removing the raised slough there appeared a raw, bleeding, painful area underneath.

Tentative diagnosis of herpetic stomatitis or necrotic gingivitis was made.

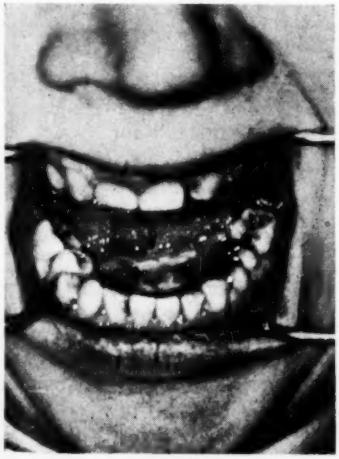

Figure I.

Figure II.

Figure III.

Medication

The patient had been rinsing her mouth with ½ teaspoon flavored sodium perborate in a glass of water. She alternated this with a teaspoon of peroxide in a ¼ glass of water. She was advised to discontinue this and use ⅓ teaspoon of

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bicarbonate of soda in a glass of warm water every two hours.

The patient was asked to return in two days. She returned in a week and told us that she had been to a dermatologist and a laryngologist. They both made a diagnosis of vitamin deficiency. She then received parenteral and oral doses of B complex and C, supplemented with a high protein diet. This did not help. She was referred to a medical center for complete systemic check-up. All the necessary laboratory tests were made without any significant findings being disclosed. Nothing was heard from the patient until six months later. We received a telephone call from her dentist stating that her child had been delivered and that soon afterwards blebs had formed over her entire body. A diagnosis of pemphigus was made and death resulted soon after.

Summary and Conclusion

1. This was a case of pemphigus with primary lesions in the oral cavity. The dentist as a specialist of the oral cavity should be the one to recognize this disease.
2. It is important that the lesions of pemphigus of the mouth be differentiated from necrotic gingivitis, agranulocytosis and erythema multiforme which they most closely simulate.
3. This case was reported in the hope that by early recognition of this fatal disease our profession may contribute to its cure when and if the etiology and treatment is determined.

156 East 52nd Street

A CUBAN DENTIST LOOKS AT DENTISTRY IN THE UNITED STATES

ELVA E. RICARDO, D.D.S.

As a graduate of Havana University Dental School and a recent arrival in this country, I have observed with great interest the heights to which dentistry has risen in the United States. This position is best exemplified by the high degree of specialization in the different branches of dentistry and the excellent cooperation among professional men.

As a special postgraduate student in an American dental school, I have observed the teaching methods, the modern equipment, the advanced techniques, and the resultant graduates, proud of their profession and leaders in the science of Odontology.

The accent on Dental Medicine has awakened the dentist to the understanding that teeth are lost for reasons other than decay, that periodontal problems have solutions other than extraction, and that the oral cavity should, indeed, be treated as a component part of the body, rather than an isolated entity.

My admiration and felicitation is extended for the developments made in the fields of Prosthetics, Crown and Bridge, Endodontia and Oral Surgery. I cannot help but feel that my association with dentistry in this country must result in my becoming a more capable, conscientious and happier practitioner.

ANSWERS TO TIMELY QUESTIONS

For each issue a pertinent question is sent to authorities for expression of their opinions. The question for this issue is,

"Under what conditions do you call upon the physician for assistance in the diagnosis and treatment of your dental patients?"

M. M. MAXWELL, CAPT. (D.C.) U.S.N.
Senior Dental Officer, U. S. Naval Hospital, St. Albans, N. Y.

The question propounded is "Under what conditions do you call upon the physician for assistance in the diagnosis and treatment of your dental patients?" A lengthy treatise could be written to adequately set forth the conditions requiring mutual cooperative efforts between dentist, physician and other workers in the fields of health. For the sake of brevity, a generalized answer may be permitted to the following effect:—Whenever the best interests of the patient's health necessitate medical treatment beyond the scope of the dental field then an appropriate medical specialist should be called upon for assistance. As a corollary to this answer it is equally true that dental practitioners should avail themselves of the assistance of specialists within their own field and physicians have the responsibility of obtaining appropriate dental assistance in the solution of certain medical problems.

It is common knowledge that a dental patient may present oral manifestations of a number of serious systemic disorders such as blood dyscrasia, avitaminosis, endocrinopathy, exanthema, toxicosis, neoplasia, etc. The dentist serving as oral diagnostician, may be the first to observe clinical evidence of these conditions, yet obviously he would not treat maladies outside of the domain of dentistry. His is the responsibility to refer patients exhibiting such conditions to competent specialists within the realm of medicine, although the optimum in treatment for some of these cases is frequently obtained by cooperative effort of both physician and dentist, each devoting himself to treatment procedures peculiar and distinctive to his own field.

Necessarily, modern dental education has taken the same biologic approach to its problems as medicine, consequently oral maladies cannot be viewed entirely from local aspects, without taking into consideration total physiology. Segregation of the different parts of the anatomy into distinct, unrelated series of parts is a physiologic impossibility. It is therefore mandatory that all practitioners in the various fields of health service evaluate and correlate that data from their special provinces in a spirit of close cooperation to best serve the needs of humanity.

The burden of greatest responsibility in diagnosis and treatment is dependent upon the specific type of pathology encountered. Oral pathosis, predominantly classified in a qualitative and quantitative sense as dental disease, is of primary concern to the dentist while oral conditions which are reflections of generalized disease processes are prime considerations for solution by the medical internist. For example, dental caries, periodontosis, maxillary osteomyelitis, etc., regardless of their systemic relationships are initial responsibilities of the dental profession whereas blood dycrasias, endocrinopathies, etc., exhibiting oral manifestations, are obviously the primary responsibility of the physician.

Apropos of the present considerations it seems fitting to quote M. W. Carr[1] who states, "When uncommon, perplexing or grave conditions are encountered or when severe or sudden crises develop during the course of medical (dental) or surgical treatment, it is common professional practice to call into consultation one or more specialists whose knowledge and skill may be of benefit to the patient. In the final analysis the only consideration should be what is best for the patient."

"The opinions or assertions contained herein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large. (Art. 113 (2) U. S. Navy Regulations)"

1. CARR, M. W.: Dentistry, An Agency of Health Service, The Commonwealth Fund, N. Y., 1946, P. 83.

DAVID TANCHESTER, D.D.S., FACD
Chief of Dental Clinic, Montefiore Hospital

The constant state of flux in modern medicine, which brings to light daily, almost hourly, new discoveries in causes and treatment of disease, in new drugs, serums, etc., has broken down the barrier which once separated the dental from the medical branches. It is now general procedure for the dentist, physician, and surgeon to consult with each other freely and to cooperate fully in the care and treatment of their patients.

From a careful study of national surveys of illness in this country, and of the patients under my own observation, either in the hospital or in the office, I have come to the conclusion that in the general dental practitioner's office, at least one-third of the active patients are afflicted with some form of chronic disease. Patients present suffering from tuberculosis, diabetes, cardiac diseases, blood dyscrasias, etc., and in such cases, necessary consultation with the patient's physician is routine practice. But, sometimes the patient is not aware of existing disease, and it is the dentist's duty to recognize the pathognomonic symptoms by the various clinical manifestations, and recommend that the patient seek medical attention, thereafter maintaining a close working connection with the physician.

Cases of endocrine involvement, blood dyscrasias, arthritides, cardiac involvement and numerous other illnesses definitely require early consultation by the dentist and the physician in order to correlate their respective findings and arrive at the proper treatment.

Whenever dental surgery is to be performed on a patient who is under treatment of a physician, I have a consultation with the physician. When a patient is known to have diabetes, it is best to be sure that he is under the care of a physician before undertaking oral surgery. A patient with acute rheumatic heart disease can be safely treated surgically in a dentist's office when dentist and physician cooperate on the post-operative care. Likewise, in cases of blood dyscrasias and cardiac conditions, dentist and physician must work closely together when oral surgery is required.

In the dental care of a pregnant woman, consultation with her physician is necessary because of the recent change of thought regarding calcium intake. Extensive research and experiments have resulted in the conclusion that calcium must not be prescribed indiscriminately, as was done too often heretofore, because too much calcium sometimes makes for a difficult delivery.

At the present time, the Dental Practice Act permits the parenteral treatment of a patient by a dentist and also the prescribing for any oral condition where the patient has the oral manifestation caused by some systemic disease, or where the oral lesion is the cause of the general illness. This act gives us a wide field of responsibility, and it is important, therefore, that we keep fully informed on the vast flood of new discoveries and findings that is constantly pouring from the research laboratories.

Since we in dentistry have a full program in studying and digesting the results of research in our own field as fast as they come to us, it is beyond our capacities to know fully all the details of the progress of research in the other specialties of medicine as they are discovered and revealed. We must, therefore, in the best interest of the public and our patients, cooperate with the practitioners in these other specialties, concentrating on the new methods and discoveries in our own field and maintaining a reading, workable knowledge of the progress in general medicine. Though we may understand the various laboratory tests and be able to read the biopsy material, we may not be in a position to analyze the complete picture of these various tests, and so it is necessary to call on a physician who can study each phase, give it the proper value in relation to the whole, and in this way we can make an intelligent diagnosis. Then dentist and physician, working together, can give the patient the best treatment and attention his condition calls for.

ABSTRACTS AND COMMENTS

THE EFFECTS OF VARIOUS NUMBERS OF TOPICAL APPLICATIONS OF SODIUM FLUORIDE

W. A. JORDAN, O. B. WOOD, J. A. ALLISION and V. D. IRWIN

J.A.D.A.—Nov. 1946

In September 1944, eleven hundred and thirty school children, ages 6-12, were treated with a 2 percent solution of sodium fluoride. Prior to application of sodium fluoride each child received a prophylaxis consisting of scaling and polishing the teeth and a detailed dental examination with mouth mirror and explorer.

Only the teeth in half of the mouth of each child were treated—one upper and one lower quadrant. The teeth in the untreated half of the mouth were used as controls. The treatment, after prophylaxis, consisted of isolating with cotton rolls the teeth to be treated, drying them with compressed air, and applying to all surfaces of the teeth, by means of a cotton swab, a 2 percent solution of sodium fluoride. The teeth were kept free of saliva and the mouth was held open for four minutes after the application to assure dryness of the solution.

300 children received one treatment, 630 children received two treatments, 200 children had three treatments. Treatments were at weekly intervals. In the fall of 1945, approximately one year after the fluoride treatments had been administered, the teeth of the children were re-examined and by the same person who made the original examination.

241 children of the original 300 having one treatment were re-examined. The findings indicate that one application of sodium fluoride apparently had only a slight effect in preventing dental caries, and this effect was confined to the upper quadrants. The data presented indicated that there was a caries reduction of 4.9 percent between the treated and the untreated quadrants, in favor of the treated quadrants, of both the deciduous and permanent teeth.

575 children of the original 630 children having two treatments were re-examined. Combining the findings for the treated and the untreated quadrants of those having two applications of sodium fluoride, it is observed that the results are better than those found after the single application. 14.5 percent less caries developed in the treated deciduous teeth than in those untreated, and 10 percent less caries developed in the treated permanent teeth than in the untreated ones.

161 children of the original 300 children having three treatments were available for re-examination. Only children enrolled in the third to sixth grades were included in this study. The findings indicated that the combined treated quadrants of the deciduous dentition show 40 percent fewer teeth becoming carious or filled in the treated than in the untreated teeth. However, the total number of deciduous teeth was extremely small, so the extent of this difference may or may not be due to sampling variation alone. Combined totals for the permanent dentition show that 21 percent less caries developed in the treated teeth than in the untreated teeth.

Findings of the above three studies indicate a reduction of dental caries corresponding to the increased number of applications of sodium fluoride. However, the maximum results obtained in studies previously reported were not reached in the three treatments. It is therefore evident that more than three treatments are necessary to obtain the maximum results. Thus, for the permanent teeth, two treatments gave a result more than twice as good as that obtained by one treatment, and three treatments gave results twice as good as that obtained by two.

This study indicates that the number of treatments has a direct bearing on the results achieved by topical application of a 2 percent solution of sodium fluoride to children's teeth. It also indicates that three treatments are not sufficient to provide the maximum possible amount of caries control.

To achieve maximum results, the minimum number of treatments needs to be more than three, probably four, but fewer than eight. Topical application of sodium fluoride in one, two or three treatments had little effect on teeth that were previously carious or filled.

This study verifies the finding that topical applications of sodium fluoride are effective in lowering the incidence of dental caries.

L. S.

THE REST POSITION OF THE MANDIBLE AND ITS SIGNIFICANCE TO DENTAL SCIENCE

JOHN R. THOMPSON,

D.D.S., M.S.D., M.S.

J.A.D.A.—Feb. 1946, Chicago, Ill.

1. Dental science has been hampered by the teaching that the teeth contribute to the height of the face. This concept was based on examination of skulls and plaster models with the teeth in occlusion.

2. This concept has led to the assumption that as dental height diminishes through attrition or loss of teeth, there is a corresponding loss in the height of the face. This loss has been held responsible for the sinking in of the lips in the edentulous.

3. The application of the foregoing concept and its corollary to the clinical practice takes the form of bite raising technics which have for their object the restoration of supposedly diminished vertical height.

4. A long series of scientific investigation on the living have shown that the prevailing concept is incorrect. These studies have been conducted on a large series of children from birth to eight years, on children from eight years through adolescence, on children with complete anodontia and on edentulous adults. Without exception it has been shown that the mandible assumes its positional relationship to the head by the third month of life and thereafter does not change.

5. The position here referred to is a resting position determined by a balance of the musculature which suspends the mandible. It is not affected by either the presence or the absence of teeth. This position alone determines the height of the face.

6. The difference between the height of the face when the mandible is at rest and when the teeth are in occlusion is determined by the amount of space between the upper and lower teeth when the mandible is at rest. This, which is called the free-way space, averages 2-3 mm. in normal dentition. In abnormal it may be 10 mm. or more.

7. All attempts to increase the vertical dimension of the face beyond that established by the rest position of the mandible have been shown to result in failure. Not only does the mandible return to its resting position, but it invariably establishes a normal free-way space as well.

8. In some persons the path of closure is found to be abnormal because of occlusal interference. In these cases the mandible may be displaced during deglutition and mastication. If the free-way space is larger in such a case, the mandible may over-close to a considerable extent with resultant severe discomfort. Such cases may be relieved by filling in the free-way space to within the normal 2-3 mm. and by eliminating occlusal interference.

9. In accordance with these findings, the analysis of cases involving extensive restorative procedures and the classification of malocclusion should be based on the rest position of the mandible and not on the occlusion of the teeth.

L.S.

BOOK REVIEW

Oral Diagnosis and Treatment, 2nd Edition. By Samuel Charles Miller, D.D.S., F.A.C.D., Associate Professor in charge of the Periodontia Department, New York University College of Dentistry; and 30 contributors. 613 illustrations. Pp. 903. Price $10. Philadelphia. The Blakiston Company, 1946.

The second edition of this work has been thoroughly revised. This has been necessary because of the tremendous expansion in the methods and treatment of oral diseases in the last 10 years since the first edition. The authors have completely rewritten every chapter. The text is complete and contains the very latest developments on such various subjects as aerodontia, penicillin therapy and dosage, diseases of the salivary glands, the relationship between oral and systemic diseases, the successful control of dental caries, the setting up of occupational dental programs, etc. Hundreds of other questions on modern procedure in the handling of fractures, vitamin therapy, psychosomatic dentistry, etc. are answered.

The contributors to this book are all eminent men in their respective fields. A listing of the chapters of the book would indicate that it is a dental and oral medical education. This second edition of "Oral Diagnosis and Treatment" has been aptly sub-titled "A textbook for Students and Practitioners of Dentistry and Medicine."

The book is interestingly written and the material well presented. Mechanically, the type is large and the paper of a quality that brings out roentgenograms and halftones to perfection. All line cuts and halftone illustrations were executed by a professional medical artist. This is one of the important books of the year and should be read by every dentist and physician.

L.R.B.

ANNOUNCEMENTS

ANNUAL MEETING

The annual meeting of the American Academy of Dental Medicine will be held in New York City on Sunday, June 15, 1947.

All members interested in presenting clinics on subjects related or pertaining to dental medicine are requested to write to

DR. SIDNEY SORRIN
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Further details of this meeting will be forthcoming.

The Publication Committee will be pleased to receive material in the various branches of Dental Medicine for publication in this Journal. Please address Editor.

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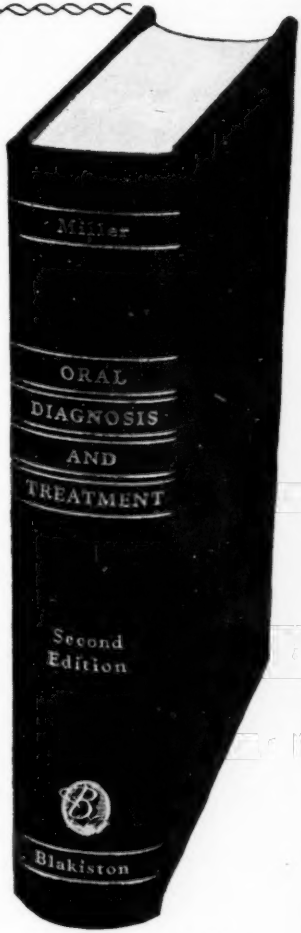

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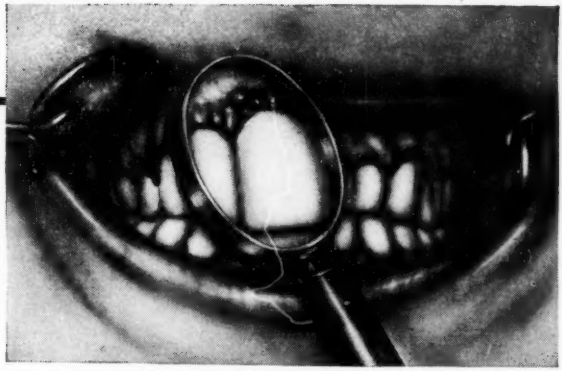

Once Gingivitis was Non-Existent

Evidence of periodontal disease in prehistoric skulls is extremely rare because teeth and gums were well massaged by concentrated muscular energy required to chew coarse, unrefined food of the era.

Today's diet tends to result in soft, flaccid gum margins and broken tissues leading to gingival infections. To avoid this condition artificial stimulation produced by the toothbrush and massage is indicated.*

IPANA plus massage has proved superior to mere mechanical massage for increasing gingival blood supply. Over an adequate period of time IPANA plus massage can thus augment local tissue defense as supplied by the blood.

IPANA is designed to give gingival stimulation while aiding in removal of acid-irritant carbohydrate plaques of materia alba often found on the gingival third of teeth.

IPANA plus gentle, brief massage can be recommended with confidence for sound oral hygiene.

*The Problem of Gingival Massage, Dent. Survey, 21: 1577-84 (Sept.) 1945.

IPANA
TOOTH PASTE

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